

**DRIVING STATUS AND OUT-OF-HOME SOCIAL ACTIVITY LEVELS:
THE CASE OF OLDER MALE VETERANS**

by

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PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

in the
Gerontology Program

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SIMON FRASER UNIVERSITY

April 2003

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ABSTRACT

North Americans are largely dependent upon driving and access to private vehicles to meet their transportation requirements. The consequences of not being able to drive are most profound for older adults because they are more likely to experience a reduction or termination of driving due to health declines or loss of functional skills. This project examined the effect of driving status (driver/non-driver) on level of out-of-home social activity participation among a nationally drawn sample of older Canadian male Veterans. Carp's (1988) model of person-environment fit, in which transportation is identified as a key factor in the degree of fit between personal needs and the ability access community services to meet those needs, was used as a conceptual framework. Socio-demographic characteristics, health-related factors and housing location were conceptualized as moderators, influencing both driving status and social activity participation rates.

Data used in this project were drawn from the 1997 Veterans' Care Needs Survey. The sample included approximately 1300 community dwelling, male Veterans, aged 60 years and older. Seventy seven point two percent of the sample were active drivers. In terms of participation in out-of-home social activities, 36.6% reported high levels of participation, 49.2% reported moderate levels and 14.2% reported low levels. Compared to the general Canadian male population, this sample was older and in poorer health.

Multivariate analyses were conducted to test the relationship between level of out-of-home social activity and driving status while controlling for socio-

demographic characteristics and health-related factors. Driving status was moderately associated with level of out-of-home social activity participation, after controlling for other factors. Statistically significant associations were also found between level of out-of-home social activity and age, marital status, income, perceived health, number of health problems, outside mobility, psychological distress and vision impairment. The full model explained approximately 17% of the variance in outside social activity. Overall, moderate support was found for the hypothesis that driving status affects level of out-of-home social activity participation - active drivers participate more frequently in out-of-home social activities than non-drivers.

Acknowledgement

Without the support, encouragement and assistance of a number of individuals, this project would not have been possible. First, I would like to acknowledge my senior supervisor, Dr. Andrew Wister for his advice, encouragement and infinite patience. I would also like to express my sincerest thanks to various Veterans Affairs Canada employees including: Dr. David Pedlar (Departmental Gerontologist) who paved the way for me to access Veterans' data; Irene Lugsdin (District Director) who approved work leave to allow me time to devote to this research; Merren McRae (Supervisor) for her flexibility, support and motivation; and finally all my co-workers who provided both practical and emotional support. Special thanks also go to my family, particularly my partner Mark and daughter Kendall, for their ongoing support and patience. Finally, I would like to thank my father, Murray McDougall, who is both a Veteran and an older adult living with the consequences of driving cessation, for providing the inspiration for this research.

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Chapter One: Introduction

It is impossible to overstate the importance of driving and access to private vehicles for meeting the transportation needs of North Americans. Driving allows for easy access to friends and family, shopping, work and volunteer opportunities, health care, leisure activities and religious expression. Without the ability to transport oneself easily, individuals are often cut off from many of these activities and opportunities. The issue of access is most profound for older adults who are more likely to experience a reduction or termination of driving due to health declines or loss of functional skills. Transportation issues are particularly important given the fact that the proportion of seniors is gradually increasing in Canadian society. By 2026, senior citizens are expected to account for 21% of the population, compared with only 13% in 2000 (Statistics Canada, 2001). The question of how driving status affects older adults' ability to participate fully in all aspects of their lives is therefore timely and worthy of further study.

Research and Policy Initiatives Relating to Older Drivers

Over the past 30 years, various research trends have been noted within the gerontological literature on driving, transportation and community mobility (Finlayson & Kaufert, 2002). At the 1971 White House Conference on Aging, the issue of transportation was unexpectedly ranked third, after income and health, in importance (Carp, 1988). Research in the 1970s and early 1980s focused on how and where people moved around in their communities. This included

collection of data on trip making and analysis of travel destinations. In the 1990s the focus changed to describing how age and disease affects driving abilities and to the investigation of vehicle crash rates (NHTSA, 1999). Much has been written in both the academic and popular literature on the safety risk of older adult drivers. An Ontario study found that crash rates for older drivers were approximately the same as for young adults (ages 16 - 24) when distance travelled was controlled (Bess, 1999; Tasca, 1998). Other researchers report that, while older adults have fewer accidents per capita, they have more accidents per mileage driven (Burns, 1999; Rosenbloom, 2000). At the same time, there are clear indications that over the next 25 years the relative and absolute number of older drivers will substantially increase largely due to population aging (Wister, Carrière, Sauter, & McWhirter, 2000). This anticipated demographic trend, combined with the statistics on crash risks, has propelled the topic of elderly driver safety into the public eye. As a result, there has been more pressure on licensing authorities to adopt regulatory measures. In addition, many jurisdictions have implemented age-related testing requirements with a goal of restricting diminished capacity drivers (Bess, 1999; O'Neill, 2000).

A subset of the transportation research throughout the 1990s focused on driving adaptations and environmental design. In an attempt to improve road safety, changes have been made to highway design and vehicle engineering (Schieber, 1994). Another emerging focus has been on the physical, sensory and cognitive skills required to drive safely and on the development of evidence based assessment of driving skills (Dobbs, 1997). Other transportation

researchers have turned their attention to ways of enhancing driver safety through rehabilitation and remediation (Freund, 2000; O'Neill, 2000). Examples of these include mature driver re-education programs, multidisciplinary driver rehabilitation services and the provision of medical treatment with a goal of optimizing the functional abilities of older drivers (e.g., removal of cataracts; prescription of medication with the least potential for cognitive and motor effects).

At the same time, there has been a growing interest in the factors associated with the decision to stop driving and the ramifications of not being able to drive (Hakamies-Blomqvist & Wahlstrom, 1998; Johnson, 1999; Persson, 1993). Much of the research on driving cessation has been qualitative in nature. Furthermore, with one notable exception that will be discussed in subsequent chapters, little research has systematically investigated the consequences of no longer being able to drive. Nevertheless, the existing qualitative literature suggests that driving cessation results in a decline in overall community mobility, which inevitably influences an older adult's ability to participate in out-of-home activities (Burkhardt, Berger and McGavock, 1996; Marottoli, Mendes de Leon, Glass, Williams, Cooney & Berkman, 2000). Concurrently, other research has found evidence to support the opinion that participation in out-of-home activities enhances well-being, increases social integration and improves both functional status and survival rates among older adults (Herzog, Ofstedal & Wheeler, 2002; Marottoli et al., 2000). Thus, the issue of out-of-home social activity participation provides an important context in which to examine the ramifications of not being able to drive (Marottoli et al., 2000). A goal of this research project is to add to

the literature on the consequences of driving cessation through a quantitative analysis of the impact of driving status upon level of social activity participation.

To proceed with this research, access to survey results that include data on both driving status and participation in out-of-home social activities was required. These data were not available in any of the large national surveys, such as the National Population Health Survey, the General Social Survey or the Survey on Ageing and Independence. Existing research on older Canadian Veterans in the form of the "Veterans' Care Needs Survey" (VCNS) (Statistics Canada, 1998) was ultimately identified as an accessible and appropriate data source. The VCNS incorporates information about driving status, out-of-home social activity participation, health factors and socio-demographic characteristics.

Veterans and Transportation

Given the fact that the focus of this research is on Veterans and specifically male Canadian Veterans, some background information regarding this population is warranted. In 1998, there were approximately 450,000 war Veterans in Canada representing 11% of the total senior population (Pedlar & MacKnight, 1998). A substantial portion of Canadian men aged 65 and over, 38% in 1995, served in the military during wartime (Statistics Canada, 1999a). In 1997, the average age of Canadian war Veterans was 74 years and was expected to rise to 84 years by 2008 (Veterans Affairs Canada, 1997). Veterans Affairs Canada (VAC) serves a subset of the general war Veteran population, specifically those who suffered a war-related disability or who qualify for health

benefits due to low income. In 1997, VAC provided services to approximately 135,000 Veteran clients (Statistics Canada, 1998).

Veterans have concerns similar to those of the general older adult population surrounding the issues of driving and transportation. In 1997, a series of twelve focus groups were conducted in various communities across Canada and included a random sample of VAC Veteran clients aged 65 years and older. The intent of these focus groups was to collect qualitative information on Veterans' current and future care needs as well as to identify gaps in supports and access to services. One of the themes identified through this research was the importance of transportation to their sense of independence and well-being. Transportation was identified as a critical service and one that was integral to their health and social lives. Many participants mentioned the importance of transportation services for managing basic functions such as visiting friends and family or going shopping. They valued the ability to travel on their own schedule and preferred not to rely on others when traveling. Transportation and driving are clearly significant issues for all older Canadians, albeit Veteran or non-Veteran.

Statement of Purpose

The purpose of this present study is to test a series of hypotheses relating to driving status and out-of-home social activity levels among a nationally drawn sample of older Canadian male Veterans. The guiding research question is, *Does driving status influence level of out-of-home social activity participation?* The intent is to add to the quantitative literature on the consequences of driving

cessation. An underlying goal is to raise awareness of the ramifications of mobility restrictions for older adults who reside within a society that is largely dependent upon driving for transportation. This project partially replicates and extends previous research conducted by Marottoli et al. (2000) that found that driving cessation is strongly associated with decreased out-of-home activity levels even after adjusting for socio-demographic and health-related characteristics.

Chapter Two: Literature Review

The following chapter reviews the pertinent literature relating to the research question, *Does driving status influence level of out-of-home social activity participation?* We begin by exploring the conceptual framework used to guide and inform this research. The issue of “driving” is then placed within the context of transportation and community mobility. Some of the consequences of driving cessation, both in terms of psychological consequences and implications for community mobility, are reviewed. This is followed by a discussion of how the environmental context affects community mobility and how social interaction enhances the well-being of older adults. Finally, several hypotheses are presented that guide this research.

Conceptual Framework

In the gerontological literature on transportation and social activity participation, there are few references either explicitly or implicitly to theoretical underpinnings. One exception can be found in the work of Carp (1988) who conceptualizes community mobility as playing a key role in the congruence between personal needs and environmental resources. The outcome of this congruence is independent living and greater well-being. Closely related to these concepts is the idea of “successful aging” as defined by Rowe and Kahn (1997). They conceptualize “active engagement with life” as being an important facet of successful aging. Carp’s (1988) model of person-environment fit and Rowe and

Kahn's (1997) model of successful aging are used to guide and inform the present study.

Carp's (1988) model of person-environment fit finds its roots in Lewin's (1951) field theory and other early person-environment interaction theorists. Lewin (1951) was the first to theorize that behavior (B) is a function of personal characteristics (P) and physical environment (E). He developed the ecological equation $[B = f(P,E)]$ to captures this relationship (Cvitkovich & Wister, 2001). Lawton and Nehemow (1973) adapted the ecological equation to make it applicable to older adults by emphasizing the interaction between person and environment (Cvitkovich, 1999). Their competence press model includes the concepts of environmental press and personal competence (Lawton, 1998). Environmental press refers to the extent to which an environment, either social or physical, makes demands on an individual. The personal resources which allow one to cope with these demands are referred to as personal competence. The "docility hypothesis" states that a person with higher competence levels is able to tolerate a greater degree of environmental press. Lack of stimulation due to low environmental press can result in little opportunity for growth. Conversely, high levels of environmental press can result in overload. In either case, well-being is negatively affected and maladaptive behavior is the outcome (Caserta, 1995). The equation $[B = f(P,E, P^*E)]$ adds to the above equation, the importance of the interaction between personal competence (P) and environmental press (E).

Carp and Carp's (1984) congruence model builds on the works of Lawton and Nehemow (1973) and other person-environment fit theorists (Cvitkovich,

1999). This model focuses on the degree of fit or the congruence between the needs and competence of the individual and the demands and resources available in the environment. It acknowledges both the positive and negative aspects of the environment as well as affirms the possibility that individuals can improve competence and modify environments (Cvitkovich & Wister, 2001). Applied to transportation and the elderly, the "needs" may include the desire to access community or social opportunities while the "competence" may refer to one's ability to drive or make use of public transportation. An example of the "demands" of the environment would be hilly terrain or long distances that preclude an older person from walking to destinations, while living in a community with specialized transit vehicles for the disabled (such as Handidart) is an example of environmental "resources". An example of overload may be a person who is unable to drive, lacks a support network from which they can request transportation assistance, does not have the financial resources to pay for taxis and lives in a rural community where public transportation is unavailable.

Carp and Carp (1984) suggest that congruence should be considered at two levels, life-maintenance and higher-order needs. Life-maintenance needs refer to the basic necessities of life that allow one to live independently. They include the need for access to food, adequate shelter, personal care, banking/finances and health care. If a person has an impaired ability to manage life-maintenance needs, environmental supports complement existing personal skills in order to achieve a basic level of competence (Schaie & Willis, 1999). Higher-order needs are necessary to give life an acceptable and positive quality.

They include the need for affiliation, social interaction, usefulness, recreation, leisure and religious worship. Environmental attributes that improve the match between resources and higher-order needs enhance the possibility of enrichment, growth and personal satisfaction (Lawton, 1998). An example may be a senior centre that provides transportation to allow its members to attend leisure and recreational programs. From an adaptational perspective, the relevant issue is the goodness of fit between the individual and the environment (Carp & Carp, 1984).

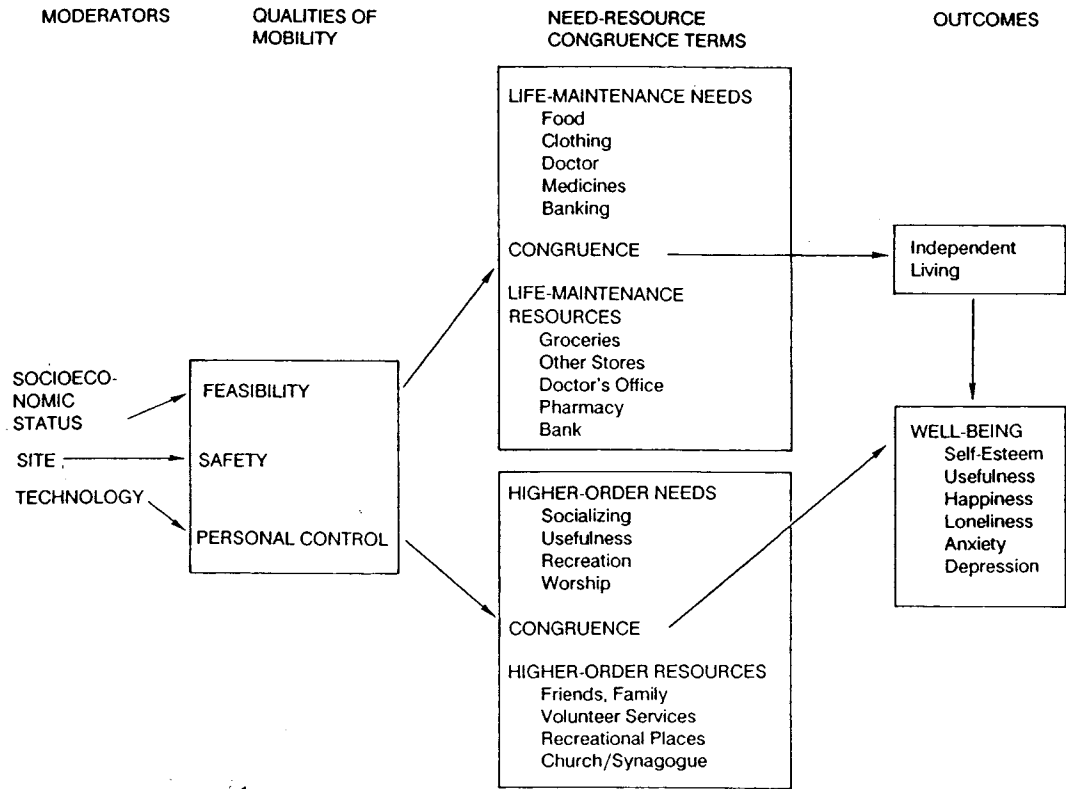
Carp (1987) further elaborates on the congruence model by identifying community mobility as a key factor in the degree of fit between personal needs and the ability to access community services to meet those needs. "The quality of later life depends upon the quality of housing and environment, made dynamic by transportation" (Carp, 1987, p.48). People must travel into the community to access facilities and services to meet both life-maintenance and higher-order needs. Without access, the existence of resources (i.e., stores, banks, churches, senior centers) is virtually meaningless.

Within this model (Figure 1), well-being is conceptualized to include a sense of positive self-esteem, feelings of usefulness, happiness, social connectedness and reduced levels of anxiety and depression. For positive well-being to occur, both life-maintenance and higher-order needs must be addressed. Satisfaction of life-maintenance needs is a requisite to independent living, which in turn, positively influences well-being. Fulfillment of higher-order needs affects well-being directly by "giving life an acceptable and positive quality"

(Carp, 1988, p.4). Qualities of mobility that affect the congruence between a person's needs and the community's resources include feasibility, safety and a sense of person control experienced by the traveler. Finally, moderators such as socio-economic status, site and transportation technology affect mobility (Carp, 1988). This model is particularly relevant to the present research project because it specifically highlights mobility as a key factor in the interaction between personal competence/needs and environmental demands/resources.

For purposes of this research project, the ability to drive is conceptualized as a personal competence that facilitates one's ability to participate in social activities, thereby meeting higher-order needs and enhancing well-being. Socio-demographic factors such as age, income and social support are considered moderators that affect both driving status and social activity participation. Although not specifically included in Carp's (1988) model, health-related factors are also defined as moderators that influence driving status and social participation rates. Finally, the concept of site, operationalized as housing location (e.g., urban/rural), is identified as a moderating factor. Even though the concept of well-being is central to Carp's (1988) model, it is beyond the scope of this research project to examine well-being as an outcome.

Figure 1: Carp's conceptual model



Reproduced with permission of the Transportation Research Board. In Special Report 218: Transportation in an Aging Society: Improving Mobility and Safety for Older Persons, Volume 2, Transportation Research Board, National Research Council, Washington, D.C., 1988, Figure 1, p. 5.

Closely related to Carp's (1988) concepts of independent living and well-being is the idea of "successful aging". Rowe and Kahn (1997) define successful aging as the ability to maintain three key behaviors or characteristics: (a) low risk of disease and disease-related disability; (b) high mental and physical functional capacity; and (c) active engagement with life. Successful aging is the combination of all three of these characteristics and is distinct from usual aging (Rowe & Kahn, 1998). Of particular interest to the present study is the concept of active engagement with life. This construct, itself comprising maintenance of social relationships and involvement in productive activities, is useful for conceptualizing the social activity participation of older adults.

In terms of the maintenance of social relationships, Rowe & Kahn (1998) contend that social connectedness has a positive impact on health. They cite four factors to support the argument that social relations and health are interconnected. These include: (a) lack of social ties is a risk factor for poor health; (b) the many forms of social support have a direct positive effect on health; (c) social support can act as a buffer to reduce the health-related effects of aging; and (d) the effectiveness of the supportive action depends upon the person, the situation and the needs. Based on research conducted through the MacArthur Foundation Study of Successful Aging, Rowe & Kahn (1998) found that the strongest predictors for overall well-being among older adults were frequency of visits with friends and frequency of attendance at organizational meetings. The present research is based on this perspective, in that one of the

key variables of interest - out-of-home social activity - is conceptualized as a positive factor that serves to enhance the well-being of older adults.

Mobility, Transportation and Driving

Before discussing the ramifications of driving cessation, one first needs to understand how driving relates to the larger concepts of transportation and mobility. For the purpose of this research, mobility is defined as “a person’s purposeful movement through the environment from one place to another” (Owsley, Allman, Gossman, Kell, Sims & Baker, 2000, p. 305). Mobility exists on a continuum from no mobility (i.e., bed bound) on one extreme, to being able to travel for extended periods and long distances from home on the other (i.e., world travel). Community mobility is broadly defined to encompass movement within and around one’s community while transportation is the means by which community mobility occurs (Finlayson & Kaufert, 2002).

For most people, both young and old, transportation means driving (Cobb & Coughlin, 2000). The vast majority of North Americans rely on an automobile to meet their transportation needs, either as driver or as passenger. In 1996, almost 60% of older adults living in private homes (1.7 million Canadians) were drivers (Millar, 1999). There are several reasons that the automobile remains the dominant mode of transportation. First, automobiles offer many desirable travel characteristics such as flexibility and convenience. They provide the user with an ease of access and capacity for spontaneity unparalleled in other forms of transportation. Secondly, in many communities other forms of transportation are

not available, not extensive enough, too expensive or undesirable. In addition, contemporary public transportation policies and zoning practices have served to maintain the automobile's role as the preeminent means of transportation (Yassuda, Wilson & von Mering, 1997). Finally, perceptions surrounding the automobile have become intertwined with basic North American values of independence, freedom and self-sufficiency (Burkhardt, 2000). Corn and Sacks (1994) refer to the automobile as an "American institution" and a symbol of socio-economic status, masculinity, independence and adulthood. It is because of the automobile's fundamental role as a means of transportation that driving cessation has such significant consequences for older adults.

Consequence of Driving Cessation

The transportation literature suggests that driving cessation has both psychological impact and practical implications for older adults. Although the practical implications of driving cessation are the primary focus of this research, many of the other consequences are closely intertwined and warrant brief discussion.

Psychological Consequences of Driving Cessation

In our society, driving an automobile is an instrumental activity of daily living, often associated with personal independence, a sense of control and social roles. Loss of a driver's license is perceived as a threat to self-esteem and an attack on personal dignity often implying social disability and dependency on

others (Bahro, Silber, Box & Sutherland, 1995; Campbell, Bush & Hale, 1993; Winter, 1996). Eisenhandler (1990) refers to the driver's license as an *asphalt identikit*, a symbol that allows the elderly to maintain a non age-related and therefore non-stigmatized identity. The holder of a driver's license is recognized as being a competent adult with the rights of an active member of society. The current cohort of elderly has been socialized to accept the automobile as a symbol of many positive attributes. Having a valid driver's license and being able to drive are tangible ways of maintaining continuity of self across the life periods and remaining connected with the mainstream social world. As long as "car keys, automobiles and licenses" remain symbols of adulthood and membership in the larger community, the loss of a license will negatively impact identity and marginalize the elderly by precluding them from full participation in society. Driving cessation signifies the realization of old age identity and the stigma of dependency (Fonda, Wallace, & Herzog, 2001)

The point at which the elderly relinquish their driving privileges is often perceived as a watershed event with implications regarding independence, self-sufficiency and social status (Burkhardt, 2000). Although some argue that the elderly are better able to accept and adapt to life changes that are appropriate for their age, much of the literature on driving does not support this perspective (Gillins, 1990; Neugarten, 1968). Driving cessation is frequently referred to as a negative rite of passage and as such, may have both short and long term negative repercussions in a way similar to other stressful life events (Fonda et al., 2001).

Existing research appears to confirm an association between driving cessation and increased depressive symptoms among older adults. Martollioli et al. (1997) using longitudinal data from the New Haven Epidemiologic Studies of the Elderly (n = 1,316), found that driving cessation was a strong predictor of increased depressive symptoms, even after accounting for socio-demographic and health-related variables. Fonda et al. (2001) using data from the Asset and Health Dynamics Among the Oldest Old Study (n = 3,543) found similar results. Subjects who stopped driving were at greater risk for later reporting worsening depressive symptoms than either those who continued to drive or those who limited their driving distances. Respondents from a qualitative study on driving cessation and dementia mentioned depression, loneliness, isolation and increased alcohol use as consequences of no longer being able to drive (Adler, Rottunda, & Kuskowski, 1999). In a study of 418 rural Americans, loneliness was significantly correlated with lack of transportation (Gillins, 1990; Kivett, 1979).

For many people, particularly men, driving is an important facet of adult life that shapes personal identity (Wallace & Franc, 1999). Carp (1971) suggests that driving cessation is more problematic for men than for women. Among the current cohort of older men, automobiles and driver's license are synonymous with ideas of power and masculinity. In focus group research, Burkhardt et al. (1996) found that men were more likely to see driving as part of their identity and to blame external factors for driving restrictions. Women were less likely to perceive driving as central to their identity and reported more personal reasons for driving reduction. Men tend to begin driving at an earlier age, drive more miles

over their lifetime and continue driving longer than women. The current cohort of elderly men also has a history of being the main transportation provider within the family (Burkhardt et al., 1996). Despite the fact that several authors argue that driving cessation is a “men’s issue”, there is no research that has been conducted uniquely on this population.

Driving Cessation and Community Mobility

There is evidence within the research literature that driving cessation leads to a decline in overall community mobility (Burkhardt et al., 1996). Mobility constraints result in a gap between the activities in which older adults want or need, and their capacity to obtain adequate transportation to access them (Rosenbloom, 2000). Using information from a Maryland household survey of people aged 60 years and over, Burkhardt (1994) found that ‘driving one’s own car’ was the most common mode of travel for 75% of their sample. Older adults make over 90% of trips by private vehicles, either as driver or passenger (Straight & McLarty Jackson, 1999). In an analysis of travel behavior of older adults aged 75 years and older, drivers reported an average of six trips per week compared to a rate of two trips per week reported by non-drivers (Straight, 1997). Although there may be other variables that affect trip making not accounted for by this study, the results suggest that restriction of community mobility is an issue for the older population (Evans, 2001).

As has been previously argued, the need for travel can be grouped into two main categories: life-maintenance and higher-order trips (Carp, 1988). In an

examination of travel patterns of older adults residing in a non-urban area, Stamatiadis, Leinbach and Watkins (1996) found that although life-maintenance trips were ranked as the most important form of travel by approximately 62% of the subjects, higher-order trips represented the largest percentage of trips at 60%. Data from the 1995 US Nationwide Personal Transportation Survey found that 42% of seniors' private vehicle trips were for social, recreational, civic, educational or religious activities (Straight & McLarty Jackson, 1999). Focus group research suggests that among non-drivers, transportation to social and recreational activities is more difficult to locate than to shopping, medical appointments and errands (Burkhardt, 2000).

Despite an extensive literature search, only one quantitative study was found within the gerontological literature that examined the impact of driving cessation upon higher-order trip making. Using data from the longitudinal New Haven Established Populations for Epidemiologic Studies of the Elderly (EPESE), Marottoli et al. (2000) found that driving cessation was strongly associated with a decrease in out-of-home activity levels even after controlling for socio-demographic and health-related factors. Data were collected at three points between 1982 and 1987. Of the 1,316 subjects, 38% were active drivers, 7% had stopped driving over the course of the study and 55% had never driven or had stopped prior to 1982. An activity scale was created based on self-report participation in a number of social activities that required out-of-home mobility. These out-of-home activities were specifically chosen because it was assumed that driving cessation would affect participation. The activities included: shopping;

going to a movie, restaurant or sporting event; day or overnight trips; volunteer work; playing games, cards or bingo; attending religious services; participating in voluntary associations; and paid employment. Socio-demographic factors included in the analysis were age, gender, race, marital status, number of years of education, and housing type (public, private or independent community). The health-related factors incorporated into the study include number of chronic conditions, cognitive status, sensory impairments (vision and hearing loss), and limitations in activities of daily living (ADLs). The intent of the present research project is to partially replicate this study.

The Environmental Context of Driving Cessation

Carp (1988) theorizes that “site”, specifically the physical characteristics of the location such as weather conditions and terrain, has a moderating influence on mobility. In addition, housing location and its interaction with distance (from community services and social places), is one of the most frequently cited environmental factors affecting seniors’ community mobility (Wallace & Franc, 1999; Finlayson & Kaufert, 2002). The literature also identifies other environmental factors, such as crime, pollution, and time of day (e.g., rush hour travel), that may impair an older adult’s ability to travel. The choices that older adults make with respect to residential location have obvious consequences for their community mobility.

Although there exists a myth that older adults primarily reside in high-density urban areas, the reality is quite different (Cobb & Coughlin, 1998).

American statistics from 1995 indicate that approximately 44% of older people live in the suburbs, 28% live in rural areas and only 28% live in urban areas. A significant portion of the older population is “aging in place” within the suburban communities of their youth and this trend is likely to continue (Straight & McLarty Jackson, 1999). Most elderly are able to function in low density, spread out communities because they drive. The prevalence of automobiles and the enhancement of road systems to cope with increased vehicle traffic means that public transportation is often under-funded and other modes of transit are undeveloped (Rosenbloom, 1993; Warnes, 1992). In rural communities, access to a vehicle is particularly important because of the lack of public transit and the distance from basic amenities. In 1996, approximately 60% of rural and small town senior Canadians were drivers compared to only 46% in large urban centres (Statistics Canada, 1999b).

Social Engagement and Discretionary Social Activities

There is a growing body of literature that supports the notion that social engagement, and more specifically discretionary social activity, has an important positive influence on both mental well-being and physical health status. Herzog et al. (2002) in their review of the current status of theory and research relating to social engagement and its health consequences, define social engagement as the activities a person performs within the context of their social environment. They go on to categorize several forms of social engagement. These include: (a) social activities, the direct interaction with one's social network through the

creation and maintenance of social relationships; (b) productive activities such as volunteer work or paid labour, in which the individual makes a contribution to their neighbourhood or society in general; (c) helping activities such as the giving and receiving of emotional and instrumental help; (d) educational and intellectual activities; and (e) leisure activities including those activities that are done at the discretion of an individual and are beyond professional, social or family obligations. In terms of this research project, the specific focus is on discretionary activities of a social nature that are pursued during one's free time, by personal choice.

Why is discretionary social activity a legitimate focus for academic research? The answer lies in the emerging gerontological literature that links this form of social engagement to a range of mental and physical health benefits. Although research on social networks and social support has long demonstrated the protective effect of social integration on health, it is only more recently that research has focused on the health benefits of social and leisure activities, net of physical activity (Herzog et al., 2002). Several prospective studies that explored a range of leisure, religious and social activities, as compared to social integration, found that participation is significantly associated with lower mortality risks and improved functional health (Bygren, Konlaan, & Johansson, 1996; Glass, Mendes de Leon, Marottoli & Berkman, 1999; House, Robbins, & Metzner, 1982; Welin, Larsson, Svardsudd, Tibblin & Tibblin, 1992). The benefits of participation in social activities remained after adjusting for age and other risk factors. In addition, some researchers suggest that men who engage

in social activities may benefit from this participation even more so than women (House et al., 1982; Welin et al., 1992). Given the fact that the sample used in the current research project is uniquely male, an analysis of factors related to social activity participation is of particular interest.

Factors Affecting Driving Status and Social Activity Participation

As has previously been discussed, there is ample evidence within the research literature supporting the argument that driving cessation negatively influences social activity participation. Of particular note is the quantitative study by Marottoli et al. (2000) in which driving cessation was found to be strongly associated with decreased out-of-home activity levels. The present study draws upon Carp's (1988) model of community mobility, in which socio-demographic characteristics, site and health-related factors are conceptualized as moderators that influence mobility outcomes. It is hypothesized that driving status will predict level of out-of-home social activity even after accounting for socio-demographic characteristics including location of residence, and health-related factors.

In addition, both age and health status are hypothesized to independently influence one's ability to drive and to participate in out-of-home social activities. Age, is consistently reported as a significant factor negatively affecting both driving status (Burkhardt, 2000; Chipman, Payne & McDonough, 1998; Cutler & Coward, 1992; Rosenbloom, 1988) and level of out-of-home social activity participation (Horgas, Wilms & Baltes, 1998). In terms of health-related factors, there is a clear link between health and driving status, with medical problems

being the most commonly reported reason for driving cessation (Dellinger, Sehgal, Sleet & Barrett-Connor, 2001). Several large community based studies have confirmed the relationship between poor health, including poorer self-perceived health, the presence of neurological disorders or visual impairments, and driving status (Campbell et al., 1993; Marottoli, Ostfeld, Merrill, Perlman, Foley & Cooney, 1993). Marottoli et al. (1993) also found an association between both depression and restrictions in physical mobility (e.g., ability to climb stairs, to walk one-half mile) and driving cessation. Finally, there are indications in the literature that physical disability decreases the opportunity to engage in social activities and that older adults with health problems are less likely to participated in activities than healthy older adults (Herzog et al., 2002; Litwin, 2000).

Other socio-demographic characteristics are also hypothesized to influence level of out-of-home social activity. In terms of living arrangements, Evans (2001) suggests a negative relationship between large household size and out-of-home activity. Alternatively, living with others may increase the likelihood that an older adult who does not drive will have easier access to transportation. The issue of marital status is closely related to living arrangement and also warrants discussion. Although Marotolli et al. (2000) did not find marital status to be significantly associated with out-of-home activity levels, it is argued that having a spouse who is potentially able to drive would affect one's level of out-of-home social activity irrespective of driving status. Given the fact that the population of interest is older male Veterans, it is assumed that a large percentage are married, and married to younger spouses. In terms of income,

Rosenbloom (1988) argues that income levels affects the degree of transportation difficulty an individual experiences. It is reasonable to assume that income would influence an individual's ability to purchase services (e.g., pay for taxis, hire drivers) to improve transportation.

Sensory impairments are frequently cited as negatively influencing driving status (Bess, 1999). An Australian study found that having poor vision was significantly associated with the decision to stop driving (Gilhotra, Mitchell, Ivers & Cumming, 2001). In other research, vision impairments were found to be associated with reduced social participation rates (Clark, Bond, & Sanchez, 1999). Other evidence indicates that hearing impairments are not associated with driving cessation (Campbell et al., 1993). Given these results, it is hypothesized that vision impairments are more likely to restrict level of out-of-home social activity participation than hearing impairments.

Finally, location of residence is one of the most frequently identified environmental factors affecting older adults' community mobility (Finlayson & Kaufert, 2002; Straight & McLarty Jackson, 1999). For the most part, the literature suggests that older adults who reside in low density areas (e.g., rural communities) rely on driving for transportation more than those in high density areas (e.g., urban communities) (Rosenbloom, 1993; Warnes, 1992). It is hypothesized that rural residents will be less likely to participate in out-of-home social activities than their urban counterparts.

Hypotheses

Based on the literature, the following hypotheses were developed:

1. Driving status will predict level of out-of-home social activity, with non-drivers engaging in less social activity, even after accounting for socio-demographic and health-related factors.
2. a) Advanced age and poorer health will be associated with lower rates of driving frequency.
b) Advanced age and poorer health will be associated with lower rates of out-of-home social activity levels.
3. Living alone and having lower income will both be independently associated with low levels of out-of-home social activity.
4. Restrictions in out-of-home social activity levels will be found for subjects with vision impairments but not for subjects with hearing difficulties.
5. Rural residents will engage in fewer out-of-home social activities than urban residents, regardless of driving status.

Chapter Three: Methods

Data Source and Sample

The data used for this project are from a cross sectional study entitled, "Veterans' Care Needs Survey," (VCNS) carried out by Statistics Canada in June, 1997 under contract to Veterans Affairs Canada (VAC) (Statistics Canada, 1998). This survey was part of a larger Review of Veterans' Care Needs project that attempted to evaluate the health status and degree of incapacity of VAC clients, measure health care program utilization, and identify health care sectors requiring additional resources. It was designed to provide national estimates and to allow comparison among provinces, age groups, gender, type of military service and urban/rural contrasts. The survey also included data on driving status that is not readily available in other studies.

The sampling frame for this survey was created from VAC client files and contained almost 135,000 records. Following a two stage sampling procedure, the final sample included 1,799 non-institutionalized VAC clients. All World War One VAC clients (137 subjects) were included in the sample plus an equitable proportion of Veterans from World War Two (438 clients), the Korean conflict (438 clients), Special Duty areas (486 clients) and Regular Forces (300 clients). There were approximately 200 French speaking subjects and only slightly more than 50 female subjects. It is important to note that the VCNS is not representative of all Canadian war Veterans. It surveyed only a segment of this population, those Veterans' in receipt of VAC benefits and includes

representation from Special Duty areas (e.g. those who served in conflicts such as Korea, Egypt, Bosnia etc) and Regular Forces.

In the VCNS, only three percent of the respondents were women (Statistics Canada, 1998). The decision to exclude women from this analysis was based on suggestions within the literature that older men's experiences with driving and driving cessation is very different from that of women (Burkhardt et al., 1996). In addition, the small number of females would be problematic in making meaningful comparison of the sexes. Because of these sampling issues, results arising out of the study should not be considered representative of the overall older adult population.

Questionnaire Design and Data Collection

The questionnaire was designed by VAC and pre-tested by Statistics Canada's Questionnaire Design Resource Centre. It includes questions from other surveys (e.g., Ageing and Independence, Health and Activity Limitations survey) as well as questions specifically formulated to address the needs and purposes of the Veterans' Care Needs Survey. In total, the survey instrument has 125 questions and took on average, 55 minutes to administer. In person interview were conducted by Labour Force Survey interviewers over the course of three weeks in June, 1997. Interviewers traveled to 34 VAC districts scattered throughout Canada to administer the questionnaire. All regions except Yukon and the Northwest Territories were included. The response rate was 93.3% with a total of 1,597 usable interviews; 43 subjects refused, 27 were untraceable, 46

could not be contacted after 10 attempts and 86 were non-respondent for a variety of reasons (death, living in institutions, out of reach etc). Sixty six of the interviews were conducted by proxy. One third of the proxy interviews were with the oldest-old age group (85 years and over) (Statistics Canada, 1998).

Data Editing and Weighting

Prior to analysis, survey data were edited for completeness and consistency. Missing year of birth data was corrected using the information from the original sampling frame and when possible, other missing data were added using the median response. Survey data were then weighted to allow meaningful inferences about the population of interest (Statistics Canada, 1998). Weighted data is used to adjust the number of units that each case represents (Vogt, 1993). The estimation weight is related to the number of individuals each subject represents and is dependent upon how the sample was created. Due to age imbalances in some provinces, an adjustment technique called post-stratification was used to anchor estimates to known VAC client counts. After accounting for non-responses and other adjustments, the average estimation weight was 85. In other words, each respondent represents approximately 85 clients. Only weighted data were made available for the analysis comprising this project.

Statistical Analyses

Initial analyses of these data were conducted by Statistics Canada and published in their Report on Findings, August 1997 (Statistics Canada, 1998). This report included information about VAC clientele's socio-demographic status, their determinants of health, the help they receive with activities of daily living, and their transportation and relocation issues.

For the present study, secondary analysis of the data was completed to test hypotheses and to explore the relationships between variables of interest. The author's original request to access raw data through Statistics Canada was declined due to concerns regarding high risk of subject disclosure related to a census of some strata of the sample (Personal communication, May 14, 2002). Data manipulation and statistical analysis for this project was ultimately completed by a Senior Statistical Consultant working with Statistics Canada based on direction from the author. It is important to note that all decisions regarding the statistical analyses used in this research, rested solely with the author. Again, due to confidentiality concerns, only weighted data and results were made available (Personal communication, Sept 9, 2002). As a result of recoding decisions in which subjects under age 60 and females were excluded from the analysis, the weighted total of all subjects is 114,267.

Measurement

Variables were chosen based on a comprehensive review of the literature. In many cases, the variables were similar to those used by Marottoli et

al. (2000) in their study on driving cessation and activity levels. Because this research was a secondary analysis of existing survey data, variables were also selected based on the availability of data.

The primary dependent variable of interest is *participation in out-of-home social activities*. As we have previously discussed, current theory and research suggests that participation in discretionary higher-order social activities positively influences both well-being and physical health (Glass et al., 1999; Rowe & Kahn, 1998). *Participation in out-of-home activities* implies some requirement for community mobility. Thus, mobility, transportation and ultimately, driving ability facilitate access to these out-of-home social activities. The *driving status* and *driving frequency* variables were chosen as a result of previous research, largely qualitative, which suggests that changes in ability to drive has negative practical consequences for community mobility (Bonnel, 1999; Eisenhandler, 1990; Straight, 1997). Other variables used in this research fall within two categories, socio-demographic characteristics including housing location (e.g., site) and health-related factors.

Dependent Variable

The primary dependent variable of interest is *participation in out-of-home social activities*. This is taken from the survey question "How often do you a) talk on the telephone with friends and family, b) have visits from friends and family, c) visit friends or family, d) eat out with friends or family, e) go out, for example, to shop, to the mall, for coffee, on picnics, movies etc., f) go to the

Legion or other veterans' organization or clubs, g) go to other senior's organizations or clubs." The responses to each of these sub-questions is "at least once a day, at least once a week, at least once a month, less than once a month, never." Because the variable explicitly relates to out-of-home mobility, sub-questions a) and b) have been excluded. The frequency of out-of-home social activity participation was computed by assigning a number to each response; for example, "at least once a day" was assigned a 4 while "never" was assigned zero. Finally, an additive scale with a range of 0 to 20 was computed. This scale is similar to that used by Marottoli et al. (2000) in their analysis of out-of-home activity levels and driving cessation. It represents "an aggregated summation of discrete (in some cases unrelated) activities and constitutes a reasonable index of the amount of activity in which a participant engages" (Marottoli et al., 2000, p.S336). For bivariate analyses purposes, a four point ordinal scale was created. Due to very low cell counts at the highest level, scores between 10 and 20 were combined in the final crosstabulations.

Since one of the central themes in this research is driving, both *driving status* (driver/non-driver) and *driving frequency* are conceptualized as dependent variables for some bivariate analyses. *Driving status* is also used as an independent variable in the multivariate analysis. The *driving status* and *driving frequency* variables relate to the survey questions "Do you have a valid driver's license?" and "How often do you drive a vehicle?" Responses include: everyday, several times a week, once a week, several times a month, once a month, less than once a month, never. An ordinal scale was created with a range from

“drives everyday” to “no valid driver’s license or never drives”. Whenever possible, the *driving frequency* variable is used; however due to low cell count in some crosstabulations, Statistics Canada was at times only able to provide bivariate analyses for *driving status*. Unfortunately, the original wording of the question made it impossible to know if the respondents who answered “no” to the question regarding driver’s licensing were previous drivers who had lost their license or people who had never driven.

Independent variables

At the multivariate level (See Table 17), the dichotomous variable for *driving status* (non-driver/driver) was also used as an independent variable. Other variables were added in two blocks, socio-demographic characteristics including site and health-related factors.

Socio-demographic characteristics

Age was recoded into three ordinal groupings (age 60 to 69, age 70 to 79 and age 80 and over). One reason for this regrouping was to increase the size of the old-old group. The original analysis used “85 years and older” and reported that only 3% of the total population was within this age group (Statistics Canada, 1998). Another reason for this regrouping was that many jurisdictions use age 80 as the age for a first mandatory driver’s licensing re-examination (Bess, 1999). In terms of gender, only males were included in the analysis.

Marital status was recoded to “married” which included both legally married and common-law and “non-married” which combined separated, divorced, widowed and never married. *Living arrangement* categories were “living alone”, “living with spouse” and “living with others”, which compressed a list of responses (including other family members, friends, tenants etc.) into one category. Survey subjects were asked to state the highest level of *education* that they had completed. Responses were recoded into “some secondary or less/other” (which included post-war training, informal training such as carpentry, butcher), “graduated from high school” and “attended some post-secondary or university”. *Income* was assessed using respondents’ estimate of 1996 household income and was categorized into “less than \$20,000”, “\$20,000 to \$39,999” or “\$40,000 and over”. *Residence location* was either “urban” or “rural”. The survey defined a “rural” resident as anyone whose postal code had a “0” as the second digit.

Health-related factors

The *perceived health* variable was taken from the question “Compared to other people your age, would you say, in general, that your health is... excellent, good, fair, or poor?” *Number of health problems* is an interval scale created by counting “yes” responses to a list of common health-related problems presented to the survey subjects. The variable, *outside mobility*, was taken from the question “Can you walk about 3 city blocks (that’s about half a kilometer or a ¼ of a mile) without resting?” Responses include: by yourself (except for a cane), with

some help (from a walker, or person), not at all and does not attempt. "Does not attempt" responses were combined with "not at all" to create one category. The variable related to *psychological distress* was based on a series of questions in which subjects were asked about their perceptions and feelings about life. A positive response to three of more questions regarding negative feelings indicates that an individual may be depressed (Statistics Canada, 1998). An interval scale was created by counting the number of negative responses. *Hearing and vision impairment* variables were based on self-report of level of sensory impairment. Responses to the questions How well can you hear? and How well can you see? Were: "quite well", "average", "not too well" or "very poorly". A dichotomous variable was created by combining "quite well/average" and "not too well/very poor" categories for both variables.

Variable Descriptions and Comparisons to Non-Veteran Population

In order to identify areas where the survey participants are similar to or vary from the general population and to allow observations regarding the ability to generalize these results to other populations, characteristics of the sample are compared to other established statistics on older Canadian males. For comparison purposes, the most recently available statistical information is reported. In some cases, the statistical information is very recent (e.g., 2001 Census data for the variable *age*) while for other variables the only available statistics were less current (e.g., 1991 Survey on Ageing and Independence for the variable *participation in out-of-home social activities*).

Univariate results for the dependent variables *driving frequency* and *participation in out of home social activities* can be found in Table 1 and Table 2 respectively. The socio-demographic and health-related characteristics of survey participants are shown in Table 3. It is important to note that the frequencies reported are based on weighted data. Nevertheless, percentages will not be influenced to a great extent with weighting. The total n size for the weighted results is 114,267. Based on an average estimation weight of 85, the actual sample is approximately 1,300 male Veterans.

Driving Frequency: Results from the 1996/97 National Population Health Survey indicate that 59% of all Canadian seniors and 77% of senior men hold a valid driver's license (Millar, 1999). Senior men are much more likely to drive, and to drive more frequently, than senior women. Earlier data drawn from the 1991 Survey of Ageing and Independence indicate that 65% of all men drove three or more times per week compared to only 21% of all women (Millar, 1999). Results relating to *driving frequency* within the sample are shown in Table 1. About 77% of the sample are active drivers, which is fairly consistent with the rate of licensure found for all senior men. In terms of *driving frequency*, rates observed in this sample appear to be fairly similar to those seen in the general male population. Almost 70% of the sample drove either several times a week or daily.

Table 1: Driving Frequency

	Frequency	Percentage
No License/ Never Drives	26,092	22.8%
Drives infrequently	8,476	7.4%
Drives several times per week	19,991	17.5%
Drives everyday	59,708	52.3%
Total	114,267	100%

Participation in out-of-home social activities: The 1991 Survey on Ageing and Independence included a section on the social life and activities of older adults. Approximately 34% of all seniors reported that, during a typical month they frequently visited friends or relatives and 39% reported that they frequently attended clubs, church or community centre (Statistics Canada, 1992). Because the variable relating to social activity participation was operationalized in a very different way in the present study, it is difficult to compare results. Nevertheless, results from the present study show that almost half of the sample participated in out-of-home social activity to a moderate degree (see Table 2).

Table 2: Participation in Out-of-home Social Activity

	Frequency	Percentage
Low (Score 1 – 4.99)	16,246	14.2%
Moderate (Score 5 – 9.99)	56,202	49.2%
High (Score 10 – 20)	41,819	36.6%
Total	114,267	100%

Age: Based on 2001 Census data, Canadian males aged 60 years and older numbered 2,284,220 and represented 7.6% of the total population. Of the total male senior population, 51% were aged 60-69, 35% aged 70-79 and 13%

aged 80 and over (Statistics Canada, 2002b). Not unexpectedly, the age of respondents in the current study is skewed with a large percentage (73.4%) falling within the 70-79 age range (see Table 3). Only 14.7% are between age 60-69 and only 11.9% are age 80 years or older.

Table 3 – Socio-demographic and Health-related Characteristics of Male Veterans

Variables	Frequency	Percentage
Age		
60 to 69 years	16,744	14.7
70 to 79 years	83,910	73.4
80 years and over	13,613	11.9
Marital status		
Non-married	22,321	19.5
Married	91,946	80.5
Living arrangement		
Lives alone	18,602	16.3
Lives with spouse	91,131	79.8
Lives with others	4,533	4.0
Education		
Some secondary or less/other	80,417	70.4
Graduated high school	18,700	16.4
Post-secondary/university	15,150	13.3
Annual Income		
Less than \$20,000	54,076	47.3
\$20,000 to \$39,999	45,338	39.7
\$40,000 and over	14,852	13.0
Residence		
Urban	74,760	69.0
Rural	33,524	31.0
Perceived health		
Excellent	11,128	9.7
Good	33,911	29.7
Fair	45,715	40.0
Poor	23,513	20.6
Number of Health Problems		
None	3,696	3.2
1 to 2 health problems	24,327	21.3
3 to 4 health problems	27,914	24.4
5 to 6 health problems	35,746	31.3
7 or more	22,584	19.8

Variables	Frequency	Percentage
Outside Mobility		
Not at all	26,907	23.6
With help	9,630	8.4
Without help	77,731	68.0
Psychological Distress		
None	39,815	38.8
One	22,950	20.0
Two	18,802	15.6
Three or more	33,700	29.5
Vision		
Not too well/poorly	20,099	17.6
Quite well/average	94,167	82.4
Hearing		
Not too well/poorly	21,642	18.9
Quite well/average	92,625	81.1

Marital Status: 2001 Census data shows that approximately 73% of all male seniors (aged 60 and over) were married. Seventy five percent of those aged 60-69, 74% of other aged 70-79 and 61% of those aged 80 and over were married (Statistics Canada, 2002c). Among the study sample, 80.5% were married.

Living arrangement: In 2001, 78% of all men aged 65 and older who resided in private households, lived with a spouse. Only 17% of older men resided alone while 5% lived with others (Statistics Canada, 2002d). This distribution is fairly similar to that observed among older male Veterans in the current study with 79.8% residing with a spouse, 16.3% residing alone and 4% residing with others.

Education: Based on 1991 Census data, 76% of men aged 65 and older reported having some secondary or trade school education or less. Only 11% graduated from high school and about 13% went on to other post-secondary

academic education (Statistics Canada, 1993a). Among the sample population, 70.4% has some secondary or less/other, 16.4% graduated from high school and 13.3% attended post secondary/university.

Income: In the 1991 Survey of Aging and Independence, 55% of all senior men (aged 65 and over) reported incomes of less than \$20,000, 34% reported income between \$20,000-39,999 and 10% reported income of \geq \$40,000. The proportion reporting lower income levels increased according to age with 49% in the age 65-69 group reporting income of less than \$20,000 compared to 58% in the age 70-79 group and 63% in the age 80 and over group (Statistics Canada, 1992). Within the study sample, 47.3% reported income of less than \$20,000, 39.7% reported income between \$20,000-39,999 and 13.0% reported of \$40,000 and over.

Residence: Based on 1991 census data, senior men (aged 60 and over) were more likely to reside in urban areas (75%) than rural communities (25%) (Statistics Canada, 1993b). This study found that 69% of older male Veterans resided in urban areas and 31% resided in rural areas.

Perceived health: In 2001, the self-rated health of senior men (aged 65 and over) was as follows: 13.2% reported excellent health, 23.5% reported very good health, 33.0% reported good health and 30.2% reported fair/poor health (Statistics Canada, 2002e). In the present study, 9.7% of older male Veterans reported perceived health of excellent, 29.7% reported good health, 40.0% reported fair health and 20.6% reported poor health.

Number of health problems: In 1997, 78% of community dwelling senior men aged 65 and over reported that they had been diagnosed with at least one chronic health condition (Statistics Canada, 1999a). Among the study sample, only 3.2% reported that they had no health problems; 21.3% reported 1-2 problems, 24.4% reported 3-4 problems, 31.3% reported 5-6 problems and 19.8% reported 7 or more health problems.

Outside mobility: Information regarding mobility disability was collected in the 2001 Participation and Activity Limitation Survey¹. The rate of mobility disability among the general Canadian male population, aged 65 and older was found to be 26.9% (Statistics Canada, 2002f). Among the Veteran sample, 23.6% reported that they were not at all able to walk 3 city blocks, 8.4% reported that they could walk this distance with some help and the majority (68.0%) were able to walk this distance without difficulty.

Psychological Distress: Data from the Canadian Community Health Survey 2000/01 indicates that the rate of possible or probable depression among senior men is 3.8% (Statistics Canada, 2002e). In contrast, 29.5% of the older male veterans from the current study responded positively to three or more questions on negative feeling, suggesting a possible increased rate of depression among this population (Statistics Canada, 1998).

¹ The Participation and Activity Limitation Survey defines mobility disability as: difficulty walking half a kilometre or up and down a flight of stairs, about 12 steps without resting, moving from one room to another, carrying an object of 5 kg (10 pounds) for 10 metres (30 feet) or standing for long periods (Statistics Canada, 2002f, p.75).

Vision: Information regarding seeing disability was collected in the 2001 Participation and Activity Limitation Survey². Among the general senior male population, a seeing disability is reported by 6.5% of this population (Statistics Canada, 2002f). In comparison, 17.6% of the male Veteran sample reported that they could see “not well or poorly”.

Hearing: The 2001 Participation and Activity Limitation Survey found that 19.8% of all senior men had a hearing disability³ (Statistics Canada, 2002f). The rate of self reported hearing problems found in this study was 18.9%.

Summary

Several similarities are evident in a comparison of characteristics of older male Canadians to this study’s male Veteran sample. In terms of *driving frequency, living arrangements, outside mobility and hearing disability*, the statistics suggest that these two populations are fairly similar in their experiences. In other areas, there are some clear differences. The present study has significantly fewer subjects in the “60 to 69 age” category (14.7% compared to 51.0%) and significantly more within the “70 to 79 age” category (73.4% compared to 35.0%) than the general male senior population. The Veteran sample is slightly more likely to be married, slightly better educated, reports a somewhat higher average income and is slightly less likely to reside in an urban

² The Participation and Activity Limitation Survey defines seeing disability as: difficulty seeing ordinary newspaper or clearly seeing the face of someone from 4 metres (12 feet) (Statistics Canada, 2002f, p.75).

³ The Participation and Activity Limitation Survey defines hearing disability as: difficulty hearing what is being said in a conversation with one other person, in a conversation with three or more persons or in a telephone conversation (Statistics Canada, 2002f, p.75).

area. For some variables, specifically *participation in out-of-home social activities* and *psychological distress*, it is difficult to make meaningful comparisons between the two groups because the available statistics are not equivalent. For example, the VCNS includes data regarding a psychological distress scale however no comparable data is available for the general Canadian population.

Based on certain health indicators, this sample appears to be in somewhat poorer health than the general Canadian male population. Their perceived health is somewhat worse with 60.6% of male Veteran's reporting fair or poor health compared to only 30.2% of the general population. Almost 97% of Veterans report that they have one or more health problem compared to 78% of the general population. In addition, more Veterans reported poor vision (17.6% compared to 6.5%).

Chapter Four: Results

In this chapter, results from both bivariate and multivariate analyses are reported. Bivariate analyses use either *participation in out-of-home social activities* or *driving frequency* as the dependent variable. Although it is controversial, dichotomous nominal variables are treated as interval variables for purposes of statistical analyses. Only results that are statistically significant are reported. Because the weighting procedure creates a large sample size thereby increasing the likelihood of finding statistically significant results, only correlational statistics that are greater than +/- .05 in magnitude are considered substantively important. Multivariate ordinary least square (OLS) regression models include both significant and non-significant relationships in order to visually demonstrate the changes within the model when variable blocks are added.

Bivariate Analyses

A series of bivariate analyses were conducted, first with *driving status* as the dependent variable and secondly with *participation in out-of-home social activities* as the dependent variable. Results are discussed as they relate to the hypotheses.

Hypothesis 1: Driving status will predict level of out-of-home social activity, with non-drivers engaging in less social activity, even after accounting for socio-demographic and health-related factors.

The association generated in the crosstabular analysis tends to support the first part of this hypothesis where it is observed that there is a weak, positive relationship between *participation in out-of-home social activities* and *driving frequency* (see Table 4) (Tau C = .18, $p < .001$). The likelihood of reporting low out-of-home social activity levels (Score 1 to 4.99) is 35.0% for those respondents who have no license or do not drive compared to only 4.9% for respondents who drive daily representing a 30.1% difference between the two groups. However, the relationship between high out-of-home social activity levels (Score 10 to 20) and driving frequency is non-linear. Although high levels of out-of-home social activity are reported by 35.1% of non-drivers, this rate drops to 6.6% for those who drive infrequently but rises to 31.9% for those who drive several times a week and then tops at 43.1% for those who drive daily. One of the more unexpected results is that non-drivers appear to be equally represented in each of the low, medium and high out-of-home social activity categories.

Table 4: Participation in Out-of-home Social Activities by Driving Frequency

	No license/ never drives	Drives infrequently	Drives several times per week	Drives everyday	Total
Score 1 - 4.99	9,143 35.0%	1,629 19.2%	2,533 15.7%	2,941 4.9%	16,246
Score 5 - 9.99	7,784 29.8%	6,287 74.2%	11,086 55.5%	31,045 52.0%	56,202
Score 10 - 20	9,165 35.1%	561 6.6%	6,371 31.9%	25,722 43.1%	41,819
Total	26,092 100%	8,476 100%	19,991 100%	59,708 100%	114,267

Tau C = .18, $p < .001$

Hypothesis 2a: Advanced age and poorer health will be associated with lower rates of driving frequency.

Table 5 shows the crosstabulation of age groupings with *driving frequency* resulting in support for the hypothesis that *age* is negatively related to *driving frequency* (Tau C = -.15, $p < .001$). The likelihood of being a non-driver is 7.7% for the young-old group (ages 60-69) and 23.4% for the mid-old group (ages 70-79) compared to 37.9% for the old-old group (ages 80 and over). Thus, there is a moderate 30.3% difference between the young-old group and the old-old group in terms of non-driving. Conversely, the likelihood of driving daily is 71.3% for the young-old group, 51.2% for the mid-old group and only 35.4% for the old-old group. The percentage difference between the young-old group and the old-old group is 35.9%, signifying a moderate association.

Table 5: Driving Frequency by Age Groups

	Age 60 - 69	Age 70 - 79	≥ Age 80	Total
No license/ never drives	1,292 7.7%	19,633 23.4%	5,168 37.9%	26,092
Drives infrequently	607 3.6%	7,180 8.6%	690 5.1%	8,476
Drives several times per week	2,912 17.4%	14,139 16.9%	2,940 21.6%	19,991
Drives everyday	11,934 71.3%	42,959 51.2%	4,815 35.4%	59,708
Total	16,744 100%	83,910 100%	13,613 100%	114,267

Tau C = -.15, p<.001

A positive association between health status and *driving frequency* was also hypothesized. For purposes of this analysis, the variables *perceived health*, *number of health problems*, *outside mobility* and *psychological distress* are conceptualized as indicators of health status. As previously noted, the preference is to report *driving frequency* rather than *driving status* whenever possible, however for some crosstabulations *driving frequency* data is unavailable. In terms of *perceived health*, only *driving status* data is available. Bivariate analysis of the relationship between *driving status* and *perceived health* suggests a weak, positive relationship between these variables (Tau B = .18, p<.001). The likelihood of being a driver is 83.7% for those with excellent/good perceived health as compared to 72.9% for those with fair/poor perceived health, a 10.8% difference. The hypothesis is partially supported as respondents with better perceived health are somewhat more likely to drive (see Table 6).

Table 6: Driving Status by Perceived Health

	Fair/Poor	Excellent/Good	Total
Non-driver	18,764 27.1%	7,328 16.3%	26,092
Driver	50,464 72.9%	37,711 83.7%	88,175
Total	69,228 100%	45,039 100%	114,267

Tau B = .18, $p < .001$

An analysis of the variable, *number of health problems*, by *driving frequency* also supports this hypothesis (See Table 7). There is a weak, negative association between *number of health problems* and *driving frequency* (Tau B = -.14, $P < .001$). The likelihood of being a non-driver is 18.9% for those respondents with zero to two health problems compared to 35.2% for people with seven or more health problems, a percentage difference of 16.3%. Conversely, the likelihood of driving daily is 62.8% among people with zero to two health problems compared to only 40.4% for subjects with seven or more health problems.

Table 7: Driving Frequency by Number of Health Problems

	0-2 health problems	3-4 health problems	5-6 health problems	≥7 health problems	Total
No License/ Never Drives	5,023 17.9%	5,698 20.4%	7,433 20.8%	7,938 35.2%	26,092
Drives infrequently	2,721 9.7%	1,853 6.6%	1,941 5.4%	1,961 8.7%	8,476
Drives several times per week	2,687 9.6%	4,651 13.7%	9,088 25.4%	3,565 15.8%	19,991
Drives everyday	17,592 62.8%	15,712 56.3%	17,283 48.4%	9,121 40.4%	59,708
Total	28,023 100%	27,914 100%	35,746 100%	22,584 100%	114,267

Tau B = -.14, $p < .001$

Table 8 shows the crosstabulation of *driving status* by level of *outside mobility* confirming a weak, negative association between these variables (Tau C = -.16, $p < .001$). The likelihood of being a non-driver is only 17.2% for those who are “able to walk three city blocks without stopping” compared to 38.1% for those who are “not at all able” to walk this distance, representing a 20.9% percentage difference between the two groups.

Table 8: Driving Status by Outside Mobility (ability to walk 3 city blocks without stopping)

	Without help	With help	Not at all able	Total
Non-driver	13,342 17.2%	2,488 25.8%	10,262 38.1%	26,092
Driver	64,389 82.8%	7141 74.2%	16,645 61.9%	88,175
Total	77,731 100%	9,630 100%	26,907 100%	114,267

Tau C = -.16, $p < .001$

Hypothesis 2b: Advanced age and poorer health will be associated with lower rates of out-of-home social activity levels.

In terms of *age*, there is a weak, inverse association between *age* and *out-of-home social activity levels*, lending support for the hypothesis (Tau B = -.11 $p < .001$) (see Table 9). The likelihood of reporting low out-of-home social activity levels is only 7.5% for the young-old, compared to 23.4% for the mid-old group and 30.9% for the old-old group. This represents a difference of 23.5% between the young-old group and the old-old group. In terms of high out-of-home social activity levels, 25.4% of the old-old compared to 39.3% of the young-old participate in this level of activity.

Table 9: Participation in Out-of-home Social Activities by Age Groups

	Age 60 - 69	Age 70 - 79	≥ Age 80	Total
Score 1 - 4.99	1,255 7.5%	10,778 12.8%	4,212 30.9%	16,246
Score 5 - 9.99	8,905 53.2%	41,351 49.3%	5,946 43.7%	56,202
Score 10 - 20	6,583 39.3%	29,806 37.9%	3,454 25.4%	41,819
Total	16,744 100%	83,910 100%	13,612 100%	114,267

Tau B = -.11, $p < .001$

For purposes of this analysis, the variables *perceived health*, *number of health problems*, *outside mobility* and *psychological distress* are conceptualized as indicators of health status. A weak, positive association is evident between *out-of-home social activity participation* and *perceived health*, lending support to the hypothesis (Tau C = .16 $p < .001$) (see Table 10). The likelihood of reporting high out-of-home activity levels is 45.7% for people who perceived their health to be good compared to only 21.3% for people with poor health, a difference of 24.4%. Low activity levels were reported by only 8.1% of people with perceived their health to be good, compared to 21.9% of those with poor perceived health, representing a 13.8% percentage difference between the two groups. A small degree of non-linearity can be observed within the excellent perceived health category. Respondents who reported low activity levels were slightly more likely to report their health to be excellent compared to those in the good category (11.3% compared to 8.1%). They were also slightly less likely to report high activity levels (11.3% compared to 8.1%).

Table 10: Participation in Out-of-home Social Activities by Perceived Health

	Poor	Fair	Good	Excellent	Total
Score 1 - 4.99	5,151 21.9%	7,088 15.5%	2,752 8.1%	1,254 11.3%	16,246
Score 5 - 9.99	13,361 56.8%	22,205 48.6%	15,678 46.2%	4,958 44.6%	56,202
Score 10 - 20	5,001 21.3%	16,422 35.9%	15,480 45.7%	4,915 44.2%	41,819
Total	23,513 100%	45,715 100%	33,911 100%	11,128 100%	114,267

Tau C = .16, $p < .001$

The results relating to *out-of-home activity levels* and *number of health problems* are inconclusive. Although the findings are statistically significant, they are not substantively important. The magnitude of the statistic falls below the correspondence rule of $\pm .05$ predetermined by the researcher as the minimum magnitude in order to be considered substantively important (Tau C = -.03, $p < .001$) (See Appendix A, Table A1).

Analysis suggests a moderate, positive association between *activity levels* and *outside mobility*, defined as the ability to walk three city blocks without stopping, lending support to the hypothesis that poorer health is associated with lower levels of out-of-home social activity (Tau B = .23, $p < .001$). The likelihood of reporting high activity levels was 20.3% of those “not at all able” to walk this distance compared to 43% of those who walked “without help”, a difference of 22.7% (see Table 11).

Table 11: Participation in Out-of-home Social Activities by Outside Mobility (ability to walk 3 city blocks without stopping)

	Not at all able	With help	Without help	Total
Score 1 - 4.99	6,927 25.8%	2,395 24.9%	6,923 8.9%	16,246
Score 5 - 9.99	14,513 53.9%	4,312 44.8%	37,378 48.1%	56,202
Score 10 - 20	5,466 20.3%	2,923 30.4%	33,430 43.0%	41,819
Total	26,906 100%	9,630 100%	77,731 100%	114,267

Tau B = .23, p<.001

In terms of *out-of-home social activity* and level of *psychological distress* as measured by the Psychological Distress Scale, a weak, inverse association exists (Tau B= -.12, p<.001). The likelihood of reporting high activity levels is 41.9% for respondents with zero distress indicators (low level of psychological distress) compared to only 21.1% of those with four or more distress indicators (high level of psychological distress) (See Table 12).

Table 12: Participation in Out-of-home Social Activities by Psychological Distress Scale

	Psychological Distress 0	Psychological Distress 1-3	Psychological Distress ≥ 4	Total
Score 1 - 4.99	5,159 12.9%	6,078 12.4%	5,009 19.7%	16,246
Score 5 - 9.99	17,982 45.2%	23,133 47.2%	15,086 59.2%	56,201
Score 10 - 20	16,675 41.9%	19,771 40.4%	5,374 21.1%	41,820
Total	39,816 100%	48,982 100%	25,469 100%	114,267

Tau B = -.12, p<.001

Hypothesis 3: Living alone and having lower income will both be independently associated with low levels of out-of-home social activity.

At the bivariate level, the relationship between *participation in out-of-home social activities* and *living arrangement* is not statistically significant (Chi Square = 8.61, df = 6, n.s.). As previously noted, only results that are statistically significant are reported. The hypothesized relationship between *out-of-home social activity levels* and *income* is only partially supported, showing a weak, positive association (Tau B = .09 p<.001). The likelihood of reporting high activity levels is 31.8% for people with low income (less than \$20,000) compared to 44.2% for those with moderate income (\$20,00 to \$39,999)(See Table 13). The relationship between activity level and income suggests some degree of non-linearity. The likelihood of reporting low levels of social activity is less among those with high income (\$40,000 and over) than either the moderate or low income groups (3.9% compared to 12.5% and 18.5% respectively). Respondents with high incomes are also less likely to report high activity levels as well (30.8% compared to 44.2% and 31.8% respectively).

Table 13: Participation in Out-of-home Social Activities by Income

	Less than \$20,000	\$20,000 to \$39,999	\$40,000 and over	Total
Score 1 - 4.99	10,017 18.5%	5,654 12.5%	576 3.9%	16,246
Score 5 - 9.99	26,860 49.7%	19,641 43.3%	9,701 65.3%	56,202
Score 10 - 20	17,200 31.8%	20,043 44.2%	4,575 30.8%	41,819
Total	54,077 100%	45,338 100%	14,852 100%	114,267

Tau B = .09, p<.001

Although not specifically included in the hypothesis relating to socio-demographic factors, a weak relationship is supported between *marital status* and *level of out-of-home social activity* (Tau C = -.08, $p < .001$). The likelihood of participating in high levels of social activity is 49.2% among single respondents compared to only 33.6% among married respondents, representing a 15.6% difference between the two groups (see Table 14).

Table 14: Participation in Out-of-home Social Activities by Marital Status

	Single	Married	Total
Score 1 - 4.99	3664 16.4%	12,582 13.7%	16,246
Score 5 - 9.99	7685 34.4%	48,518 52.8%	56,202
Score 10 - 20	10,973 49.2%	30,846 33.6%	41,819
Total	22,321 100%	91,946 100%	114,267

Tau C = -.08, $p < .001$

In addition, the relationship between *income* and *driving status* was also examined with the results suggesting a weak relationship between these two variables (Tau C = .16, $p < .001$). The likelihood of being a non-driver is 31.4% for those who reported low income compared to only 10.4% among those with high income (see Table 15).

Table 15: Driving Status by Income

	Less than \$20,000	\$20,000 to \$39,999	\$40,000 and over	Total
Non-driver	16,985 31.4%	7,561 16.7%	1,546 10.4%	26,092
Driver	37,092 68.6%	37,777 83.3%	13,306 89.6%	88,175
Total	54,076 100%	45,338 100%	14,852 100%	114,267

Tau C = .16, $p < .001$

Hypothesis 4: Restrictions in out-of-home social activity levels will be found for subjects with vision impairments but not for subjects with hearing difficulties.

The hypothesized relationship between *social activity levels* and *vision* is supported at the bivariate level, confirming a weak association between the two variables (Tau C = .15, $p < .001$). As per Table 16, the likelihood of reporting high out-of-home social activity levels is 14.5% for respondents with “poor” vision compared to 41.3% for respondents with “good” vision. This represents a difference of 26.8% between the two groups. The results relating to *out-of-home activity levels* and *hearing status* are inconclusive (Tau C = .03, $p < .001$) (see Appendix A, Table A2). Although the findings are statistically significant, they are not substantively important because the magnitude of the statistic fell below the +/- .05 cutoff point identified by the researcher.

Table 16: Participation in Out-of-home Social Activities by Vision Status

	Not too well/ poorly	Quite well/ average	Total
Score 1 - 4.99	3,664 18.2%	12,582 13.4%	16,246
Score 5 - 9.99	13,528 67.3%	42,674 45.3%	56,202
Score 10 - 20	2,907 14.5%	38,912 41.3%	41,819
Total	20,099 100%	94,167 100%	114,267

Tau C = .15, $p < .001$

Hypothesis 5: Rural residents will engage in fewer out-of-home social activities than urban residents, regardless of driving status.

At the bivariate level, the relationships between both *level of out-of-home social activity* and place of *residence* (Chi-Square = 4.11, $df = 3$, n.s.) and *driving status* and place of *residence* (Chi-Square = .15, $df = 1$, n.s.) were not statistically significant.

Summary of Bivariate Results

Bivariate results both supported and failed to support various associations between the two dependent variables of interest (i.e., *driving status* and *participation in out-of-home social activities*) and the key independent variables. There is clear support for the key hypothesized relationship between *driving status* and *participation in out-of-home social activities*, with non-drivers being less likely to participate in out-of-home social activities. As hypothesized, bivariate results suggest that both advancing *age* and poorer *health* are associated with a reduction in *driving frequency* and a decrease in *out-of-home*

social participation rates. In contrast, the hypothesized relationship between *living arrangement* and *participation in out-of-home social activities* was not supported and only weak support was shown for the relationship between *income* and *social participation rates*. Bivariate analyses confirmed an inverse relationship between *vision impairment* and *out-of-home social participation rates* although results with regards to *hearing impairment* were inconclusive. Finally, the bivariate relationship between *housing location* (i.e., urban/rural) and *out-of-home social activity participation* was not statistically significant.

Multivariate Analyses

Since the dependent variable of interest, *participation in out-of-home social activities* is an interval scale, ordinary least square (OLS) regression was used for multivariate analysis. Ordinal variables are either dummy coded to create dichotomies or multiple contrasts with a reference category to provide comparisons between groups. Age is treated as an ordinal variable in order to allow comparisons between age groupings. Independent variables are added in blocks. Because *driving status* is the primary independent variable of interest it is added as the first block. Socio-demographic characteristics and health-factors are added as blocks two and three respectively. All blocks are statistically significant. Table 17 shows the results of this analysis. Block results will be discussed first followed by a review of the multivariate results as they relate to each individual hypothesis.

Table 17: Linear Regression Analyses for Out-of-home Social Activity Levels

Variable	Std Beta Block 1	Std Beta Block 2	Std Beta Block 3
Block 1: Driving Status	.29***	.33***	.24***
Block 2: Socio-demographic Characteristics			
Age 70-79 (Ref: Age 60-69)		.06*	.07*
Age ≥ 80		-.13**	-.12**
Marital status		-.68***	-.53***
Living arrangement: Lives with spouse (Ref: Lives alone)		.24*	ns
Living arrangement: Lives with others		-.24**	ns
Education: Some Secondary or less/other (Ref: University)		-.14***	ns
Education: High school		.11**	ns
Income: < \$20,000 (Ref: ≥ \$40,000)		-.14***	-.13***
Income: \$20,000 to \$39,999		.11***	.06*
Urban/rural		ns	ns
Block 3: Health Factors			
Perceived health			.17***
Number of health problems			.10***
Outside mobility: Not at all able (Ref: Without help)			-.13***
Outside mobility: With help			ns
Psychological distress			-.04*
Vision			.24***
Hearing			ns
Block R Square	.03***	.07***	.10***
Total R Square	.03***	.10***	.17***

*p<.05. **p<.01. ***p<.001

The first block is statistically significant ($R^2 = .03$, $p < .001$). *Driving status* is moderately associated with *out-of-home social activity participation* ($Beta_{\text{std}} = .29$, $p < .001$). The addition of socio-demographic variables in Block 2 results in a significant improvement in Total R square ($R^2 = .10$, $p < .001$). *Driving status* is again found to be statistically significant ($Beta_{\text{std}} = .33$, $p < .001$), and indeed, slightly increases even after controlling for the socio-demographic variables. In addition, statistically significant beta weights are found for *age*, *marital status*, *living arrangements*, *education* and *income* but not for *residence location* (urban/rural).

“Age 70-79” ($Beta_{\text{std}} = .06$, $p < .05$) and “age 80 and greater” ($Beta_{\text{std}} = -.13$, $p < .01$) compared to the reference category “age 60-69” both contribute to the regression model and will be discussed as they relate to Hypothesis 2b (see below). In terms of *marital status* ($Beta_{\text{std}} = -.68$, $p < .001$), being “married” appears to decrease one’s likelihood of participating in out-of-home social activities. *Living arrangement* also appears to have some bearing on participation rates, with the likelihood of participating in out-of-home social activities increasing for those who “lives with spouse” ($Beta_{\text{std}} = .24$, $p < .05$) and decreasing for those who “lives with others” ($Beta_{\text{std}} = -.24$, $p < .01$), as compared to the reference category “lives alone”. Having only “some secondary education or less or other education” ($Beta_{\text{std}} = -.14$, $p < .001$) decreases the likelihood that one will participate in out-of-home social activities while “graduating from high school” ($Beta_{\text{std}} = .11$, $p < .001$) increases the likelihood of participation, as compared to the reference category “university education”. Having “income less than \$20,000

per year" (Beta_{stnd} = -.14, p < .001) decreases the likelihood of out-of-home social activity participation while having "income \$20,000 to \$39,999 per year" (Beta_{stnd} = .11, p < .001) increases the likelihood, as compared to reference category "income equal or greater to \$40,000".

With the addition of Block 3 health factors, the Total R square further strengthens ($R^2 = .17$, p < .001) and results in a relatively robust model explaining 17% of the variance. *Driving status* is again found to be moderately associated with *out-of-home social activity participation* (Beta_{stnd} = .24, p < .001). Results relating to the variable *age* remain consistent to those seen in Block 2 with the likelihood of participating in out-of-home social activities increasing for those "age 70-79" (Beta_{stnd} = .07, p < .05) and decreasing for those "age ≤ 80" (Beta_{stnd} = -.12, p < .01), as compared to the reference category "age 60-69". The likelihood of participation remains reduced for "married" subjects (Beta_{stnd} = -.53, p < .001), as compared to "non-married" subjects in Block 3. In terms of income, results remain consistent to those seen in Block 2 with "income less than \$20,000 per year" (Beta_{stnd} = -.13, p < .001) decreasing the likelihood of out-of-home social activity participation and "income \$20,000 to \$39,999" (Beta_{stnd} = .06, p < .05) increasing the likelihood, as compared to reference category "income equal or greater to \$40,000". It is important to note that the beta weights for *living arrangement* and *education* were statistically significant when these variables were first entered in the analysis but did not remain significant with the inclusion of Block 3 independent variables.

In terms of health factors, statistically significant beta weights were found for *perceived health*, *number of health problems*, *outside mobility* “not at all able”, *psychological distress*, and *vision*. Having better perceived health increases the likelihood of participating in out-of-home social activities (Beta_{stnd} = .17, p < .001). Surprisingly, a greater number of health problems also increases the likelihood of participation (Beta_{stnd} = .10, p < .001). “Not at all able” to engage in outside mobility decreases the likelihood of participation in out-of-home social activities (Beta_{stnd} = -.13, p < .001), as compared to the reference category “without help”. Results relating to outside mobility “with help” were not statistically significant. Level of psychological distress is weakly associated with social activity participation (Beta_{stnd} = -.04, p < .05). Finally, having better vision increases one’s likelihood of participation (Beta_{stnd} = .24, p < .001). The association between *hearing loss* and *out-of-home social activity participation* was not supported.

Hypothesis 1: Driving status will predict level of out-of-home social activity, with non-drivers engaging in less social activity, even after accounting for socio-demographic and health-related factors.

The results of regression analysis clearly support this hypothesis - *driving status* appears to have a moderate impact on *out-of-home social activity levels*. Being a driver means that one is more likely to participate in out-of-home social activities. Statistically significant beta weights are also found for the variable *driving status* at each block in the model. The *driving status* variable remains

statistically and substantively important even after statistically controlling for socio-demographic characteristics (Block 2) and health factors (Block 3).

Hypothesis 2a: Advanced age and poorer health will be associated with lower rates of driving frequency.

Hypothesis 2b: Advanced age and poorer health will be associated with lower rates of out-of-home social activity levels.

Driving status was not used as a dependent variable in multivariate analyses, therefore only Hypothesis 2b will be discussed. With reference to *out-of-home social activity level* and *age*, multivariate results only partly support this hypothesis. Compared to “age group 60-69”, “age group 80 and older” are less likely to participate in out-of-home social activities, however, surprisingly those “aged 70-79” are slightly more likely to participate. The hypothesized relationship between health status and out-of-home social activity levels is also only partially supported. People who perceive their health to be excellent/good (compared to fair/poor) participate in higher rates of out-of-home social activities. Also, there appears to be an unexpectedly positive relationship between number of health problems and increased out-of-home social activity rates after accounting for all the other variables in the model.

Hypothesis 3: Living alone and having lower income will both be independently associated with low levels of out-of-home social activity.

In the final model, *living arrangement* was not statistically significant. In terms of income, this hypothesis appears to be only partially supported. Compared to people with high income (greater than \$40,000/year), those with low income (less than \$20,000/year) are less likely to participate in out-of-home social activities. However, those with moderate income (\$20,000 to \$39,999/year) are slightly more likely to participate.

Hypothesis 4: Restrictions in out-of-home social activity levels will be found for subjects with vision impairments but not for subjects with hearing difficulties.

Multivariate analysis partially supports this hypothesis. People who reported their vision as “quite well/average” as compared to “not well/poor” had an increased likelihood of participating in out-of-home social activities. The relationship between *level of out-of-home social activity* and *hearing status* was not statistically significant.

Hypothesis 5: Rural residents will engage in fewer out-of-home social activities than urban residents, regardless of driving status.

Place of residence (urban/rural) was not a statistically significant predictor of *out-of-home social activity levels*.

Chapter Five: Discussion

The purpose of this research project was to test a series of hypotheses relating to driving status and out-of-home social activity levels among a nationally drawn sample of older Canadian male Veterans. One of the main objectives was to add to the literature on the consequences of driving cessation for older adults through a quantitative analysis. An additional objective was to raise awareness of the ramifications of mobility restrictions for older adults who reside within a society that is largely dependent upon driving for transportation. The guiding research question was: *Does driving status influence level of out-of-home social activity participation?*

Summary of Findings and Theoretical Intergration

Carp's (1988) conceptual model, based on person environment fit theory, provided a theoretical framework for this research. The capacity to drive was conceptualized as a personal competence that facilitates one's ability to participate in social activities, thereby meeting one's higher-order needs and ultimately, enhancing well-being. Socio-demographic factors such as age, income and social support, health-related factors and housing location (e.g., urban/rural) were all conceptualized as moderating factors influencing both driving status and social activity participation. The key hypothesis, that driving status affects out-of-home social activity levels, relates directly to this theoretical framework. The results tend to support the model - being able to drive is associated with an increase in out-of-home social activity levels even after

adjusting for socio-demographic and health-related factors in this cross sectional study of older male Veterans.

This hypothesis, that driving status would predict out-of-home social activity levels, was supported at both the bivariate and multivariate level. Results are consistent with those reported by Marottoli et al. (2000) who found that driving cessation was strongly associated with decreased out-of-home activity levels. What this research suggests is that transportation restrictions - and as we have previously argued transportation means driving for most North Americans - constrict life space, narrow social opportunities and make it difficult for the elderly to meet their higher order needs. For some older adults there are gaps between the activities they need or want to engage in and their ability to obtain necessary transportation to access these activities (Rosenbloom, 2000).

To some extent, support was also found for the role of moderators (i.e., socio-demographic status, health-related factors and housing location) within this model. Although results are not consistent for all variables and at all levels of analysis, results tend to suggest that increasing age, poorer health, lower income and having vision impairments are all independently associated with lower levels of out-of-home social activity participation.

One of the interesting results identified in this research is the curvilinear relationship between driving frequency and high out-of-home social activity levels. Respondents who drive infrequently or several times per week were less likely to report high activity levels than both those who were non-drivers or who drove daily. Previous research has suggested that older drivers tend to self-

regulate their driving to avoid “high risk” situations. They may avoid night time driving, limit rush hour trips, restrict travel in bad weather conditions or only travel on well known routes (Cobb & Coughlin, 1998; Rosenbloom, 1988).

Rosenbloom (1993) argues that driver self-restrictions result in hidden mobility implications. Infrequent drivers, as in this study, may be self-limiting their driving exposure and as a result restricting their access to social activities. Incongruence may exist between their need for out-of-home social interaction and their competence to provide or obtain transportation.

There is some indication in the literature that people who have “never driven” are more capable of managing transportation options as they age than people who were previous drivers because the congruence between their needs and skills is closer (Burkhardt, Berger, Creedon & McGavock, 1998). One limitation of this survey is that the category, non-driver, includes both previous drivers and persons who have never driven. It could be argued that the reason non-drivers report more frequent social activity participation than infrequent drivers (but not daily drivers) is that this group contains never-driving respondents who are more capable of using transportation systems other than private vehicles.

Not surprisingly, increasing age is found to be associated with increasing rates of non-driving as hypothesized. These results are similar to those consistently reported in the literature. For example, Millar (1999) reports that in 1996/1997, 71% of Canadians aged 65-69, 63% of those aged 70-74, 54% of those aged 75-79, 41% of those aged 80-84 and 23% of those aged 85 and older

held a valid driver's license. Levy (1995) has suggested that mandatory license re-examinations among the older age groups in certain jurisdictions tend to deter license renewals. It may be that some of the reduction in licensing rates, particularly among those aged 80 and over, is related to this deterrent.

As hypothesized, increasing age is generally associated with decreasing levels of participation in out-of-home social activities. One of the anomalies with regards to age and social activity participation within this research is the finding at the multivariate level of analysis that people "aged 70-79" compared to those "aged 60-69" were slightly more likely to participate in out-of-home activity levels. Although not assessed by the VCNS survey, employment status among the "aged 60-69" group may contribute to reduced opportunity to participate in social activities. In 1998, 56% of Canadian men aged 55-64 and about 10% of men aged 65 and over were still employed (Statistics Canada, 1999a). Thus, employment may reduce time available to spend on social outings.

Evans (2001) suggests that social and recreational travel declines with age largely due to health reasons. However the present study, in controlling for various health factors lends support to the argument that social and leisure travel declines with age independent of health status. In a study of travel patterns and behaviors among older, non-urban adults Stamatiadis et al. (1996) found that as a person ages, trips to meet life-maintenance needs became increasingly important. In ranking the importance of trips, the elderly aged 85 and older reported that 78% of life-maintenance type travel was of highest priority. The authors suggest that the reduced importance of "quality of life" type travel among

this old-old group is due to a reduced desire to travel for reasons other than essential travel and reflects the natural aging process. The present study tends to support this perspective, with the old-old age group exhibiting less out-of-home social activity participation than other age groups even after controlling for both socio-demographic and health-related factors.

Out-of-home mobility may be of particular concern for older adults who are non-drivers and who are unable to walk short distances within the community. As hypothesized, people with greater restrictions in their level of outside mobility, specifically those who are not at all able to walk three city blocks, are less likely to be drivers. Results at the multivariate level suggest that people who are not at all able to walk short distances are less likely to participate in out-of-home social activities than those who are able to walk without help, even after controlling for driving status. Evans (2001) refers to this group as the most “housebound” and therefore probably the most restricted in their activity and social involvement.

The results relating to the relationship between out-of-home social activity and health tend to support the hypothesis that poorer health is associated with lower rates of social activity. At both the bivariate and multivariate levels the health-related variables of perceived health, outside mobility and psychological distress are all associated with out-of-home social activity levels in the expected direction. One of the unexpected findings noted at the multivariate level is the positive relationship between number of health problems and level of social activity. A similar finding is evident at the bivariate level but not reported because these results, although statistically significant, were not substantively important.

One possible explanation for this finding may be related to the fact that people with more health problems are more likely to visit doctors and obtain other types of medical care. This interaction with health professionals and others met in the course of obtaining medication treatment may be perceived as a type of social interaction. In addition, travel to medical appointments may be combined with other types of social outings such as eating lunch out with family following a medical appointment or going for coffee with a friend while waiting for a prescription to be filled.

Although the hypothesis pertaining to living arrangement was not supported, results at both the bivariate and multivariate levels suggest that marital status, which overlaps with living arrangement in part, may play a role in determining level of out-of-home social activity. Non-married male Veterans are more likely than their married counterparts to engage in higher levels of social activity. In contrast, Marottoli et al. (2000) in their study of driving cessation and out-of-home activity levels did not find marital status to be significantly associated with activity levels. The results noted in the present study may be unique to older male Veterans. For many Veterans, the Legion or other Veterans' service clubs play an important role as places to visit, to socialize with friends and to participate in leisure activities. Many older Veterans have a lifetime history of participating in these clubs and often feel comfortable visiting the Legion alone. It may be that non-married male Veterans participate in this unique type of community social organization to a greater extent than married Veterans. In the

case of the married male Veteran, it may be that more of their needs for social engagement are being met within the marital relationship (Litwin, 2000).

The hypothesis that lower income would be associated with lower levels of out-of-home social activity is only partially supported. People with higher income appear to be less likely to participate in high levels of social activity than either the moderate or low income groups. It may be that the high income group is participating in other types of social activities that are not measured by the survey such as travel or day trips.

In terms of the relationship between sensory impairment and out-of-home activity levels, the hypothesis that vision impairment but not hearing difficulties would restrict activity levels was supported. In contrast, Martolli et al. (2000) found that both visual and hearing problems were significantly and negatively associated with out-of-home activity levels. Vision impairment is frequently cited as a medical reason for driving cessation while hearing impairment has not been found to increase one's risk of driving cessation (Campbell et al., 1993). It is possible that vision impairments limits one's general mobility and as such, reduces access to out-of-home social activities. The same mobility limitations are not evident among those suffering from hearing loss.

One of the most frequently noted environmental factors in the academic literature on transportation is housing location (Finlayson & Kaufert, 2002; Rosenbloom, 1988). Where one lives in relation to services and amenities influences one's experience of community mobility and ultimately one's ability to access social activities. One of the central hypotheses tested in this research

relates to housing location. It was hypothesized that people who live in rural communities would have greater impairment in out-of-home social activity levels than urban residents. Surprisingly, results related to housing location (i.e., urban/rural), defined in Carp's (1988) model as "site", were not statistically significant and therefore make no contribution towards the model.

One reason that it may not be supported relates to the operationalization of the rural/urban dichotomy. Statistics Canada (2003a) defines urban as encompassing urban cores, secondary urban cores, urban fringes and other urban areas while rural encompasses rural fringes and other rural areas. Suburban areas are included in the urban category. In the American literature, suburban statistics are often reported separately from urban and rural statistics or reported together with rural statistics. For example, Straight & McLarty Jackson (1999) report that in 1995, 72% of older Americans lived in suburban or rural communities compared to only 28% who lived in high-density urban areas. In contrast, Statistics Canada (1993b) reports that in 1991, Canadian senior men were more likely to reside in urban areas (75%) than rural communities (25%). Although the two statistics appear quite contradictory, it is likely that the suburban population, reported differently in each case, accounts for this discrepancy. The results arising from the present research project may have been very different if suburban residents had been included into the rural category.

Limitations of Research

There are several methodological limitations inherent in this study. One of the major challenges relates to the cross-sectional data that was used for this research. Although it has been argued that driving status impacts level of out-of-home activity, it is difficult to validate the temporal ordering of these variables and the direction of causation using a cross-sectional survey. As Rosenbloom (1993) and others have reasoned, the factors that cause an older person to stop driving may be the same factors that reduce their ability and desire to participate in out-of-home activities (Carp, 1988; Marottoli et al., 2000). Only longitudinal data would allow the researcher to establish the causal order and sequencing by disentangling the effects of driving status from other antecedent variables. Nevertheless, there is good rationale to support the relationship between driving status and out-of-home activities even from a cross-sectional perspective. First, there is a fairly large collection of qualitative research that tends to support this relationship. In addition, it is logical to assume that in a culture that places such emphasize on driving as transportation, any restriction in the ability to drive will affect community mobility and ultimately access to out-of-home activities.

Measurement errors and problems surrounding the operationalization of variables represent another example of the methodological challenges inherent in this research. Although the VCNS incorporates questions similar to other established surveys (e.g., Health and Activity Limitations survey), much of the wording and some of the questions are unique to the VCNS questionnaire (Statistics Canada, 1998). In terms of the key variable of interest, out-of-home

activity levels, there are some specific measurement concerns that warrant discussion. Herzog et al. (2002) warn that many of the self-report survey questions used to measure frequency of activities suffer from likely response errors. There may be difficulties in understanding the meaning of aggregated activity categories such as “visit family and friends,” it may be difficult to report frequency of activities accurately and there are likely to be content and word biases. For example, although Canadian statistics indicate that in 1996, 37% of seniors attended church or other religious functions at least once a week (Health Canada, 1999), there were no questions in the VCNS that capture participation in religious functions.

There may also be measurement problems related to the out-of-home social activity scale. As Marottoli et al. (2000) caution, activity involvement is subject to zero-sum conditions. In other words, people only have a finite amount of time to spend on activities and spending time doing one activity means that one is less able to participate in other activities. One example drawn from the population of interest is a Veteran who attends the Legion on a daily basis but participates in few other out-of-home social activities. Despite the fact that the frequency and duration of activity participation may be high, level of out-of-home social activity as per the scale would be low because only one component of the scale, namely Legion visits, is significant.

Methodological problems are also evident with regard to the variable driving status specifically in terms of survey design. Information was only collected about the possession of a valid driver’s license and about the frequency

of driving a vehicle. For purposes of this research, information regarding length of non-driving (e.g., lifetime non-drivers, driving cessation in last six months) would have been particularly useful additional information. Because this information was unavailable, this research could not examine the effects of driving cessation (as compared to driving status) on out-of-home social activity, as was originally intended.

Another limitation is the inability to generalize the results to other populations. As Statistics Canada cautions, the results from this study should in no way be considered representative of the overall older adult population, and not even of all Veterans (Personal communication, August 29, 2002). Nevertheless, as has been previously shown, there are some similarities between this population and that of the older Canadian male. In terms of driving frequency, living arrangements, outside mobility and hearing disability, the statistics suggest that these two populations are fairly similar in their experiences. In addition, the Veteran sample is only slightly more likely to be married, slightly better educated, reports a somewhat higher average income and is slightly less likely to reside in an urban area. There are several areas where the Veteran sample significantly differs from that of the older male population. In terms of age, the Veteran sample is much more likely to be within the 70 to 79 age category (73.4% compared to 35%) and appears to be in poorer health than the general population of Canadian males.

One of the most significant methodological limitations of this project was that the author did not have direct access to the statistical data due to

confidentially concerns expressed by Statistics Canada. Data manipulation and statistical analysis for this project was completed by a Senior Statistical Consultant working with Statistics Canada, based on specific direction from the author. This confidentiality issue made recoding decisions difficult and limited the amount and scope of modifications to the statistical analysis. It is important to note, however, that the project author directed all analyses and was solely responsible for decisions regarding the direction of this research.

Again due to confidentiality concerns, only weighted data and results were made available to the author making it much more likely to find statistically significant results that are of a very small magnitude (Personal communication, Sept 9, 2002). In order to account for this issue, a correspondence rule of +/- .05 was established. Only correlational statistics that were greater than +/- .05 in magnitude were considered substantively important.

Policy Implications

Much has been written, both in the academic and popular literature on the safety risks of older drivers. As a result, there has been increasing pressure on driver licensing authorities to prevent potentially risk-prone older drivers from continuing to drive (Burkhardt et al., 1996). In 1999, five of the ten provinces had mandatory medical exam requirements for older adults, some beginning as early as age 75 (Bess, 1999). Unfortunately, policymakers and the public have focused their attention on the issue of driving safety without concomitantly addressing the issue of community mobility for older adults. As Freund (2000,

p.155) states, "The driving safety problem may be solved but the mobility problem is bigger than ever." The present research found that non-drivers were less likely to participate in out-of-home social activities than were active drivers. Driving status affects level of community mobility. The hope is that research such as the present study, that focuses attention on the practical implications of driving reduction or cessation will influence future public policy in the area of community mobility for seniors.

The goals of public policy surrounding the issue of older drivers should be to: a) keep safe drivers on the road as long as possible; and b) provide a range of mobility options to those seniors who are no longer able to drive safely (Burkhardt, 2000; Owsley, 1997). Educational programs such as the War Amps Mature Drivers Program (2003) in which members are encouraged to take driver refresher courses and become more familiar with the rules of the road, is one example of a program that seeks to enhance the skills of current older drivers. Mobility may also be preserved through vehicle and roadway re-engineering to improve safety and enhance functional ability. Roadway improvements such as enhanced highway signage and designated left hand turn lanes benefit all drivers. For those older adults who are no longer able to drive safely, access to a range of alternate transportation options is essential. Innovative services such as a demand-response transit system (Burkhardt, 2000) or coordinated volunteer driver programs need to supplement traditional public transit and para-transit services such as Handidart. It is important to note that the goals of enhancing driver safety and improving transportation options benefit not only seniors, but

other segments of society as well. All drivers benefit from initiatives that improve roadway safety and enhanced transit options are clearly a benefit to those who do not have easy access to vehicles (e.g., children, teenagers, people with disabilities, low-income families).

Future Research

As previously noted, the present study is one of the few that uses quantitative methods to investigate the practical consequences of not being able to drive. Although there is a fairly large body of qualitative research on the consequences of driving cessation, additional quantitative research is required to build on earlier findings. Because of sampling issues, only data on male Veterans was included for analysis in this project. Future research should address how gender impacts driving status, community mobility and the range of consequences related to the loss of a driver's license. It may also be helpful to place driving within the continuum of outside mobility and investigate how other mobility options either support or reduce level of out-of-home activities. Of particular interest may be the impact of scooters and other personal mobility devices on social activities levels. Finally, better measurement tools need to be developed to investigate the impact of residence location (urban/rural) on mobility. Within the qualitative literature, residence location is frequently cited as an important environmental factor that impacts community mobility. However, the present study fails to support a relationship between housing location and out-of-home social activity levels. Given the fact that the senior population is growing in

both absolute and relative numbers the issues of driving, transportation and community mobility will continue to be problematic for this population and warrants additional analysis.

Summary and Conclusions

The primary objective of this project was to investigate the effects of driving status upon level of out-of-home social activity participation among a nationally drawn sample of older Canadian male Veterans. The secondary goals were to add to the literature on the consequences of driving cessation and to raise awareness of the mobility restrictions experienced by some older adults in a society that is largely dependent upon driving for transportation.

The literature presented in Chapter 2 included a review of the conceptual framework that guided and informed the present study. Carp's (1988) model of person-environment fit in which transportation is viewed as a key factor in the degree of fit between personal needs and the ability to access community services to meet those needs, was discussed. The theory of successful aging and its component, activity engagement with life, as developed by Rowe and Kahn (1997) was also reviewed. In addition, literature regarding the consequences of driving cessation, the impact of the environment upon community mobility and the issue of discretionary social activity as a form of social engagement was presented. A series of hypotheses were identified through this literature review.

The research methodology was described in Chapter 3. This included information regarding the Veterans Care Needs survey, the sample frame, the type of statistical analysis used and measurements. This study was a secondary analysis of data originally collected from a unique population of older Canadian Veterans. In addition, characteristics of the Veteran sample were compared to other established statistics on older Canadian males. Several similarities were found between the two groups, specifically in terms of driving frequency, living arrangements, outside mobility and hearing disability. However, the Veteran group was significantly older and appeared to have poorer health than the general older male population.

Chapter 4 reported on the results from bivariate analysis and multivariate ordinary least square regression models. Results were examined as they relate to the project's hypotheses. The most significant result was that driving status has a moderate impact on level of out-of-home social activity participation even after controlling for socio-demographic and health-related variables.

A discussion of the central findings was provided in Chapter 5. Support was found for the main hypothesis, that driving status is a predictor of out-of-home social activity levels with non-drivers experiencing more restrictions in activities. Support was also found for the hypotheses related to age, health status, living arrangement, income and sensory impairments. No support was found for the hypothesis that rural residents have greater impairment in out-of-home social activity levels than urban residents. In conclusion, some of the

methodological limitations of the study were reviewed and future research and policy implications were highlighted.

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Appendix A: Additional Tables

Table A1: Participation in out-of-home social activities by Number of Health Problems

	0-2 health problems	3-4 health problems	5-6 health problems	≥ 7 health problems	Total
Score 1 - 4.99	4,943 17.6%	3,317 11.9%	3,038 8.5%	4,948 21.9%	16,246
Score 5 – 9.99	15,002 53.5%	11,229 40.2%	17,469 48.9%	12,502 55.4%	56,202
Score 10 – 20	8,078 28.8%	13,368 47.9%	15,239 42.6%	5,134 22.7%	41,819
Total	28,023 100%	27,914 100%	35,746 100%	22,584 100%	114,267

Tau C = -.03, $p < .001$

Table A2: Participation in out-of-home social activities by Hearing Status

	Not too well/ poorly	Quite well/ average	Total
Score 1 - 4.99	4,622 21.4%	11,623 12.6%	16,246
Score 5 – 9.99	8,905 41.2%	47,297 51.1%	56,202
Score 10 – 20	8,115 37.5%	33,704 36.4%	41,819
Total	21,642 100%	92,625 100%	114,267

Tau C = .03, $p < .001$